

Appl. No. 10/577,652
Amendment dated July 1, 2011
Reply to Office Action of April 5, 2011

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of claims:

1. **(Currently Amended)** Apparatus for delivering radiation to a target volume (46) beneath a skin surface, comprising:

a radiation source (16) for inputting a beam of said radiation having an input energy fluence; and

a beam conversion system (17) ~~having~~comprising:

a rotator (21) having a rotation axis in optical alignment with said beam and a first radiation directing element (24) arranged in optical communication with said radiation source comprising a reflective element rigidly mounted on said rotator having a symmetry axis (27), ~~comprising a rotator (21) having a rotation axis collinear with said symmetry rotation axis~~ for rotating said input beam around said symmetry axis said first radiation directing element adapted to direct said beam in a plurality of directions spaced around said symmetry axis, and

a second radiation directing element (25) comprising a single reflective element mounted at a fixed distance from said rotation axis facing said first radiation directing element for redirecting said directed beam through said surface radially inwards towards said symmetry axis onto said at least one target volume (46) disposed on said symmetry axis beneath said skin surface, such that said radiation is spread out in a rotational path on said surface, wherein

said first radiation directing element (24A) has reflecting surface with curvature in at most, one plane, and

said second radiation directing element (25) has reflecting surface (39) with curvature ~~convergence ability~~ in at most, one plane, and

none of said radiation impinging on said skin surface ~~on overlaps~~ with said symmetry axis, and

said energy fluence of said radiation at said target volume is higher than said energy fluence of said radiation at said skin surface.

2. **(Cancelled)**

Appl. No. 10/577,052
Amendment dated July 1, 2011
Reply to Office Action of April 5, 2011

3. **(Currently Amended)** The apparatus according to claim 1 wherein said second radiation directing element is rigidly mounted on said rotator and is rigidly coupled to said first radiation directing element. ~~further comprises a reflective element (25) for redirecting said directed beam through said surface radially inwards towards said symmetry axis onto said at least one target volume~~

4. **(Currently Amended)** The apparatus according to claim ~~3~~ 1 wherein said radiation has a spectral band between ~~804nm-300nm~~ and ~~4000nm11000nm~~.

5. **(Currently Amended)** The apparatus according to claim 31, said first radiation directing element and said second radiation directing element are selected ~~apparatus being~~ configured such that said energy fluence of said redirected radiation is less than or equal to said input energy fluence.

6. **(Currently Amended)** The apparatus according to claim 1, said first radiation directing element and said second radiation directing element are selected ~~apparatus being~~ configured such that the focal point of such beam is located ~~outside beyond~~ said target volume.

7. **(Previously Presented)** The apparatus according to claim 1 wherein said redirected radiation is in a collimated form.

8. **(Cancelled)**

9. **(Currently Amended)** Apparatus for delivering radiation to a target volume (49) beneath a skin surface, comprising:

a radiation source (16) for inputting a beam (86) of said radiation having an input energy fluence; and

a beam conversion system (17) ~~having~~ comprising:

a reflective beam divider (81) arranged in optical communication with said radiation source having a symmetry axis (82) in optical alignment with said beam for spreading said input radiation in said plurality of directions spaced around said symmetry axis, and

a single reflective beam collector (83) positioned along said symmetry axis in rigid optical alignment with said reflective beam divider for redirecting said spread out radiation through said surface radially inwards towards said symmetry axis, onto said at least one target volume (49) disposed on said symmetry axis beneath said skin surface, wherein

said reflective beam collector (83) has a reflecting surface (99) with curvature convergence ability in at most, one plane, and

said radiation has a spectral band between ~~804nm-300nm~~ and ~~4000nm11000nm~~, and

none of said radiation impinging on said skin surface overlaps with said symmetry axis,
and

Appl. No. 10/577,652
Amendment dated July 1, 2011
Reply to Office Action of April 5, 2011

said energy fluence of said radiation at said target volume is higher than said energy fluence of said radiation at said skin surface.

10. (Currently Amended) The apparatus according to claim 9, said beam divider and said beam collector are selected apparatus being configured such that said redirected beam is non-focused at said target volume.

11-14. (Cancelled)

15. (Currently Amended) A method for delivering radiation beneath a skin surface, comprising the steps of:

providing a radiation source for inputting a beam of said radiation having an input energy fluence; and

providing a rotator having a rotation axis in optical alignment with said beam; and
providing a first radiation directing element arranged in optical communication with said radiation source comprising a reflective element rigidly mounted on said rotator having a symmetry axis, collinear with said rotation axis for rotating said input beam around said symmetry axis said first radiation directing element adapted to direct said beam in a plurality of directions spaced around said symmetry axis; and

providing a second radiation directing element comprising a single reflective element mounted at a fixed distance from said rotation axis facing said first radiation directing element for redirecting said directed beam through said surface radially inwards towards said symmetry axis onto said at least one target volume disposed on said symmetry axis beneath said skin surface, such that said radiation is spread out in a rotational path on said surface, wherein

said first radiation directing element has reflecting surface with curvature in at most, one plane, and

said second radiation directing element has reflecting surface with curvature in at most, one plane, and

none of said radiation impinging on said skin surface overlaps with said symmetry axis, and

said energy fluence of said radiation at said target volume is higher than said energy fluence of said radiation at said skin surface,

~~conversion system for converting said input beam into radiation directed in a plurality of directions spaced around a symmetry axis and inclined angularly to said symmetry axis, towards at least one target volume disposed on said symmetry axis beneath said skin surface, such that:~~

~~none of said radiation impinging on said surface on said symmetry.~~

Appl. No. 10/577,652
Amendment dated July 1, 2011
Reply to Office Action of April 5, 2011

~~said radiation has convergence controllable independently in the plane parallel to the surface and in the plane perpendicular to the surface;~~

~~said radiation has a spectral band between 801nm and 1000nm.~~

16. **(Currently Amended)** A method according to claim 15 and further comprising the step of providing a single reflective element rigidly mounted on said rotator and rigidly coupled to said first radiation directing element for rotating said input radiation around said symmetry axis, such that said radiation is spread out in a rotational path on said surface.

17. **(Cancelled)** ~~A method according to claim 16 and also comprising the step of providing at least one reflective element for directing said radiation through said surface radially inwards towards said symmetry axis and said target volume.~~

18. **(Cancelled)**

19. **(Currently Amended)** A method according to claim ~~16~~ 15 and further comprising the step of providing a first radiation directing elements and a second radiation directing element for converging said radiation onto said target volume without the use of elements having optical power.

20. **(Currently Amended)** A method according to claim ~~16~~ 15 and further comprising the step of providing a first radiation directing element and a second radiation directing element wherein said radiation is non-focused at said target volume.

21. **(Original)** A method according to claim 16 and wherein said rotated radiation is in a generally collimated form.

22. **(Cancelled)**

23. **(Currently Amended)** A method for delivering radiation beneath a skin surface, comprising the steps of:

providing a radiation source for inputting a beam of said radiation having an input energy fluence; and

providing a reflective beam divider arranged in optical communication with said radiation source having a symmetry axis (82) in optical alignment with said beam for spreading said input radiation in plurality of directions spaced around said symmetry axis, and

providing a single reflective beam collector positioned along said symmetry axis in rigid optical alignment with said reflective beam divider for redirecting said spread out radiation through said surface radially inwards towards said symmetry axis, onto said at least one target volume disposed on said symmetry axis beneath said skin surface, wherein

said reflective beam collector has a reflecting surface with curvature in at most one plane, and

none of said radiation impinging on said skin surface overlaps with said symmetry axis, and

Appl. No. 10/577,652
Amendment dated July 1, 2011
Reply to Office Action of April 5, 2011

said energy fluence of said radiation at said target volume is higher than
said energy fluence of said radiation at said skin surface.

~~A method according to claims 15, and further comprising the step of providing a reflective beam divider for spreading said input radiation in said plurality of directions, and a reflective beam collector for redirecting said spread out radiation towards said target volume.~~

24. (Currently Amended) A method according to claim 23 and further comprising the step of converging said radiation onto said target volume without the use of elements having optical power wherein said redirected beam is non-focused at said target volume.

25. (Currently Amended) A method according to claim 23 and wherein said radiation has a spectral band between 801nm 300nm and 4000nm 11000nm.

26. (Previously Presented) The apparatus according to claim 1 wherein said beam conversion system converges said radiation onto said target volume without the use of elements having optical power.

27. (Previously Presented) The apparatus according to claim 1 wherein said second radiation directing element converges said radiation onto said target volume without the use of elements having optical power.

28. (Currently Amended) The apparatus according to claim 9 wherein said beam divider and said beam collector are selected~~beam conversion system~~ such that said energy fluence of said redirected radiation is less than or equal to said input energy fluence ~~converges said radiation onto said target volume without having optical power.~~

29. (New) The apparatus according to claim 1 wherein said first radiation directing element has substantially cylindrical reflecting surface.

30. (New) The apparatus according to claim 1 wherein said first radiation directing element has substantially flat reflecting surface.

31. (New) The apparatus according to claim 3 wherein said second radiation directing element has substantially flat reflecting surface.